CLAIMS

1. A method for operating a ferroelectric or electret memory device, wherein the memory device comprises memory cells in the form of a ferroelectric or electret thin-film polarizable material exhibiting hysteresis, particularly a ferroelectric or electret polymer thin film, and a first and a second set of respective parallel electrodes, wherein the electrodes of the first set are provided in substantially orthogonal relationship to the electrodes of the second set, wherein the electrodes of said first and second set are provided in direct or indirect contact with the thin-film material of the memory cells, whereby a polarization state in individual memory cells can be read, refreshed, erased or written by applying appropriate voltages to the individual electrodes of respectively said first and second set of electrodes, wherein the method implements a voltage pulse protocol comprising a read and write/refresh cycle respectively with time sequences of voltage pulses of predefined amplitudes and lengths, wherein a read cycle comprises applying a set of voltage differences to electrodes of respectively said first and second set of electrodes in case data are read out from the memory cells, wherein the write/refresh cycle of the voltage pulse protocol comprises applying another set of voltage differences to electrodes of respectively said first and second set of electrodes in case data are written/refreshed to said memory cells, said sets of voltage differences corresponding to a predefined set of potential levels such that the predefined set of potential levels has at least three separate values, and wherein the method is characterized by steps for

a) determining at least one parameter indicative of a change in a memory cell response to the applied voltage differences;

b) determining at least one correction factor for the voltage pulses as given by the voltage pulse protocol on the basis of said at least one parameter indicative of the change in a memory cell response to the applied voltage differences;

c) selecting for an adaptation of the voltage pulse protocol at least one of the following pulse protocol parameters, viz. pulse amplitudes, pulse lengths and pulse intervals; and

d) adjusting one or more parameter values of at least one of said selected pulse protocol parameters in accordance with said at least one correction factor, whereby one or more pulse amplitudes, one or more pulse lengths, and

one or more pulse intervals are adjusted either separately or in combination in accordance with a detected change in the memory cell response.

2. A method according to claim 1, characterized by adjusting in any case the values of the pulse amplitude and/or the pulse length of a switching voltage pulse in the voltage pulse protocol.

3. A method according to claim 1, characterized by determining said at least one parameter indicative of a response change in step a) by determining at least one parameter indicative of a switching speed of said ferroelectric memory, and by determining said at least one correction factor in step b) by determining a switching speed-dependent correction factor.

4. A method according to claim 3, characterized by determining said at least one parameter indicative of the switching speed in step a) by measuring an instantaneous switching speed of said ferroelectric memory.

5. A method according to claim 4, characterized by measuring said switching speed by measuring the switching speed of one or more reference memory cells.

6. A method according to claim 4, characterized by measuring said switching speed by analysing ongoing addressing operations including a switching of memory cells in the ferroelectric memory device.

7. A method according to claim 3, characterized by determining said at least one parameter indicative of the switching speed in step a) by continuously monitoring the switching speed of the ferroelectric memory device, applying at least one switching speed-dependent correction factor to the voltage pulse protocol implementing the applied voltage differences, adapting the voltage pulse protocol in real time to a change in the response to the applied voltage differences, and applying said real time-adapted voltage pulse protocol for adjusting at least one of the parameter values of the pulse protocol parameters in step d).

8. A method according to claim 7, characterized by adjusting all parameter values of at least one of the pulse protocol parameters in step d).

9. A method according to claim 3, characterized by determining a switching speed-dependent correction factor in step b) by a calculation.

10. A method according to claim 3, characterized by determining a switching speed-dependent correction factor in step b) by a reading of a look-up table.

11. A method according to claim 3, characterized by determining a first and a second switching speed-dependent correction factor in step b).

12. A method according to claim 1, characterized by determining said at least one parameter indicative of a response change in step a) taking place by determining at least one parameter indicative of a temperature of said memory device, and by determining said at least one correction factor in step b) by determining at least one temperature-dependent correction factor.

13. A method according to claim 12, characterized by determining said at least one parameter indicative of the temperature in step a) by sensing an operating temperature of said ferroelectric memory device directly.

14. A method according to claim 12, characterized by determining a temperature-dependent correction factor in step b) by a calculation.

15. A method according to claim 12, characterized by determining a temperature-dependent correction factor in step b) by a reading of a look-up table.

16. A method according to claim 12, characterized by determining a first and a second temperature-dependent correction factor in step b).

17. A method according to claim 16, characterized by determining the first temperature-dependent correction factor as a temperature coefficient, said temperature coefficient being applied for adjusting all parameter values of at least one of the pulse protocol parameters in step d).

18. A method according to claim 16, characterized by determining the second temperature-dependent correction factor as an offset voltage, said offset voltage being applied for adjusting at least one amplitude value or potential level in step d).

19. A method according to claim 16, characterized by adjusting parameter values in step d) by first performing a first adjustment in accordance with the first temperature-dependent correction factor and thereafter performing a second adjustment in accordance with the second temperature-dependent correction factor, or alternatively performing a first adjustment in accordance with the second temperature-dependent correction factor followed by a second adjustment in accordance with the first temperature-dependent correction factor.

20. A method according to claim 1, characterized by determining said least one parameter indicative of a response change in step a) by determining at least one parameter indicative of the temperature of said memory device by measuring a switching speed of memory cells in the device and applying a predetermined correlation between the measured switching speed and the actual temperature of the memory material of the cells for determining the latter.

21. A method according to claim 20, characterized by measuring said switching speed by measuring the switching speed of one or more reference memory cells.

22. A method according to claim 20, characterized by measuring said switching speed taking place by analysing ongoing addressing operations inducing a switching of memory cells in the ferroelectric memory device.

23. A ferroelectric or electret memory device, wherein the memory device comprises memory cells in the form of a ferroelectric or electret thin-film polarizable material exhibiting hysteresis, particularly a ferroelectric or

electret polymer thin film, and a first and a second set of respective parallel electrodes, wherein the electrodes of the first set are provided in substantially orthogonal relationship to the electrodes of the second set, wherein the electrodes of said first and second set are provided in direct or indirect contact with the thin-film material of the memory cells, whereby a polarization state in individual memory cells can be read, refreshed, erased or written by applying appropriate voltages to the individual electrodes of respectively said first and second set of electrodes, wherein the method implements a voltage pulse protocol comprising a read and write/refresh cycle respectively with time sequences of voltage pulses of predefined amplitudes and lengths, wherein a read cycle comprises applying a set of voltage differences to electrodes of respectively said first and second set of electrodes in case data are read out from the memory cells, wherein the write/refresh cycle of the voltage pulse protocol comprises applying another set of voltage differences to electrodes of respectively said first and second set of electrodes in case data are written/refreshed to said memory cells, said sets of voltage differences corresponding to a predefined set of potential levels such that the predefined set of potential levels has at least three separate values, and wherein a driver control unit is provided for applying via driver circuits the predefined set of potential levels to the electrodes for effecting the above-mentioned operations on selected memory cells according to the voltage pulse protocol for read and write/refresh operations, characterized in comprising means for determining at least one parameter indicative of a change in the memory cell response to the applied voltage differences, a calibration memory connected with an output of said means for determining at least one correction factor based on said parameter indicative of the change in the memory cell response, and one or more control circuits connected with an output of the calibration memory for applying an adjustment of one or more parameter values of at least one voltage pulse protocol parameter, said one or more control circuits being connected to control inputs on a memory control unit and/or a driver control unit, whereby the voltage pulse protocol with one or more parameters adjusted in accordance with the change in the memory cell response can be applied to the electrodes of the memory device via driver circuits and decoder circuits connected between the outputs of the driver control unit and the electrodes.

24. A ferroelectric memory device of claim 23, characterized in that said means is connected with one or more pairs of reference memory cells in the memory device.

25. A ferroelectric memory device of claim 23, characterized in that a signal analyser is provided and connected between a sense amplifier bank and the calibration memory for performing an analysis of response of the memory cells to read or write/refresh operations executed thereon.

26. A ferroelectric memory device of claim 23, characterized in that said means comprises a temperature sensor for sensing an operating temperature of the ferroelectric memory device.

27. A ferroelectric memory device of claim 26, characterized in that said temperature sensor, said calibration memory and a set of driver circuits are all located within a temperature compensation circuit.

28. A ferroelectric memory device of claim 26, characterized in that the temperature compensation circuit is an analog circuit.

29. A ferroelectric memory device of claim 26, characterized in that the temperature compensation circuit is a digital circuit.